

What is claimed is:

1. In a system having a plurality of rechargeable battery cells arranged in at least one string having a plurality of  
5 serially connected battery cells to form a battery system and including a charger coupled across said at least one string, a method for determining the internal impedance of each of said plurality of serially connected battery cells in said at least one string while the battery cells remain connected in the  
10 battery system, the method comprising the steps of:

a) drawing a first predetermined current  $I_1$  across a first battery cell in said at least one string;

b) measuring the voltage  $V_{1,1}$  across said first battery cell during the drawing of said first predetermined current;

15 c) measuring the voltage  $V_{2,1}$  across a second battery cell in said at least one string during the drawing of said first predetermined current;

d) drawing a second predetermined current  $I_2$  across said second battery cell;

20 e) measuring the voltage  $V_{1,2}$  across said first battery cell during the drawing of said second predetermined current;

f) measuring the voltage  $V_{2,2}$  across said second battery cell during the drawing of said second predetermined current;

g) solving the two simultaneous equations

25 
$$I_1 = V_{1,1}/Z_1 + V_{2,1}/Z_2$$

$$I_2 = V_{1,2}/Z_1 + V_{2,2}/Z_2$$

for  $Z_1$  and  $Z_2$ , where  $Z_1$  is the internal impedance of said first battery cell and  $Z_2$  is the internal impedance of said second battery cell;

30 h) calculating an impedance multiplier term  $IM$  from the equation  $IM = (Z_2 I_1)/(I_1 Z_2 - V_{2,1})$ ; and

i) for each of the remaining battery cells in said at least one string

i1) drawing a predetermined current I across said each battery cell;

5 i2) measuring the voltage V across said each battery cell during the drawing of said predetermined current; and

i3) calculating the internal impedance Z of said each battery cell from the equation  $Z = (V/I)IM$ .

10 2. The method according to Claim 1 wherein said at least one string comprises at least two strings and the steps a) - i) are performed for each of the at least two strings in the battery system.

15 3. The method according to Claim 1 wherein said first and second battery cells are adjacent to each other.